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| SERIAL NUMBER | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. |
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| 07/852,517    | 03/17/92    | YAMAZAKI             |                     |

ESM1/0920  
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| EXAMINER  |
|-----------|
| SAADAT, M |

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 2508     | 9            |

DATE MAILED: 09/20/93

This is a communication from the examiner in charge of your application.  
COMMISSIONER OF PATENTS AND TRADEMARKS

- ☐ This application has been examined ☒ Responsive to communication filed on 6-16-93 ☒ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), — days from the date of this letter.  
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- ☐ Notice of References Cited by Examiner, PTO-892.
- ☐ Notice of Draftsman's Patent Drawing Review, PTO-948.
- ☐ Notice of Art Cited by Applicant, PTO-1449.
- ☐ Notice of Informal Patent Application, PTO-152.
- ☐ Information on How to Effect Drawing Changes, PTO-1474.
- ☐

Part II SUMMARY OF ACTION

- ☒ Claims 1-22 are pending in the application.  
Of the above, claims 5-14 are withdrawn from consideration.
- ☐ Claims \_\_\_\_\_ have been cancelled.
- ☐ Claims \_\_\_\_\_ are allowed.
- ☐ Claims \_\_\_\_\_ are rejected.
- ☒ Claims 1-4, 15-22 are objected to.
- ☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.
- ☐ This application has been filed with Informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
- ☐ Formal drawings are required in response to this Office action.
- ☐ The corrected or substitute drawings have been received on \_\_\_\_\_. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
- ☐ The proposed additional or substitute sheet(s) of drawings, filed on \_\_\_\_\_, has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).
- ☐ The proposed drawing correction, filed \_\_\_\_\_, has been ☐ approved; ☐ disapproved (see explanation).
- ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. \_\_\_\_\_; filed on \_\_\_\_\_.
- ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
- ☐ Other

EXAMINER'S ACTION

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I. Rejection of claims 4 and 18-20 under 35 U.S.C. § 112, second paragraph has been overcome by Applicants' amendments and remarks.

II. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

III. Claims 1-4 and 15-22 are rejected under 35 U.S.C. § 103 as being unpatentable over Pankove (U.S. Patent No. 4,803,528) in view of Wolf et al (Silicon Processing for the VLSI Era). The semiconductor device as disclosed by Pankove is formed in an oxygenated single crystal silicon film deposited over a substrate. The film is initially made of polycrystalline material which becomes single crystal upon irradiation or application of laser. Pankove discloses the claimed invention except for existence of the other impurities in the silicon such as carbon or nitrogen. Wolf et al teach that it is known to add

impurities such as carbon or nitrogen to silicon as set forth at pages 19-21. They teach a method for measuring oxygen and carbon concentration in silicon indicating that such impurities are common in single crystal silicon and providing the limits for the indicated measurements methods for oxygen, carbon, and nitrogen. Such limits indicate that concentrations in the specified range are commonly measured in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Pankove with those of Wolf et al in order to form doped silicon since forming recrystallized silicon films using irradiation or laser results in doped silicon with impurities of the kind and concentration as indicated in the cited references.

Absent any particular teachings to show how such impurities with a specified concentration may be achieved, a natural doping of the silicon that allows such common impurities exist in the single crystal film is considered to be prior art as taught by Wolf et al. The limitations of Raman spectroscopy of the film cannot be given weight since they are results of activities that are performed after the structure is formed. Claim 3 includes process limitations that do not affect the final structure of the claimed device because the additional thermal treatment only enhances the crystalline features of the film without changing the claimed structure.

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IV. Claims 5-14 are withdrawn from consideration as being drawn to a non-elected invention, the election having been made without traverse in the response, paper No. 6.

Applicants are requested to cancel the non-elected claims as part of the response to this office action. Note that cancellation of the non-elected claims would not preclude the later filing of a divisional application on the non-elected invention (35 USC 120, 121: 37 CFR 1.60).

V. Applicant's arguments filed June 16, 1993 have been fully considered but they are not deemed to be persuasive.

With respect to the method by which the doped silicon is formed, process limitations cannot be given any weight during examination of device claims. For example, the method of crystallizing the non-crystal silicon or measuring the intensity of scattered light by Raman spectroscopy are process method and activities performed independent of the structure of the claimed device.

The Wolf reference was argued by Applicants to merely disclose a method of measuring the presence of oxygen and carbon in silicon. Such teaching implicitly indicates the presence of carbon and oxygen impurities in silicon as a common dopant in a substantially intrinsic semiconductor. However, the specification does not include any reference to the nature of

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theses impurities and their structural significance such as forming a junction. It appears that such impurities are natural dopant and are added to silicon during the deposition of the silicon layer without performing any particular process.

VI. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 C.F.R. § 1.136(a).

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL ACTION IS SET TO EXPIRE THREE MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE IS FILED WITHIN TWO MONTHS OF THE MAILING DATE OF THIS FINAL ACTION AND THE ADVISORY ACTION IS NOT MAILED UNTIL AFTER THE END OF THE THREE-MONTH SHORTENED STATUTORY PERIOD, THEN THE SHORTENED STATUTORY PERIOD WILL EXPIRE ON THE DATE THE ADVISORY ACTION IS MAILED, AND ANY EXTENSION FEE PURSUANT TO 37 C.F.R. § 1.136(a) WILL BE CALCULATED FROM THE MAILING DATE OF THE ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX MONTHS FROM THE DATE OF THIS FINAL ACTION.

VII. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahshid Saadat whose telephone number is (703) 308-4915.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

*MDS*

MDS  
September 14, 1993

*Rolf Hille*  
ROLF HILLE  
SUPERVISORY PATENT EXAMINER  
GROUP 2500